THE PAUSE PROCEDURE: A TECHNIQUE TO HELP MILDLY HANDICAPPED STUDENTS LEARN LECTURE CONTENT

BY

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Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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The purpose of this study was to investigate the effect of the lecture-pause procedure (LPP) on the factual recall and objective test performances (immediate and delayed) of learning disabled adolescents enrolled in ninth grade general science classes offered by special education departments. In the LPP, the lecturer pauses for 2 to 3 minutes at least three times during the lecture. During the pause, students are encouraged to share notes and discuss the lecture content.

The study consisted of a training and a LPP implementation phase. General science classes were randomly assigned to the experimental or control condition. A 2 x 2 factorial design and a two-way analysis of variance (ANOVA) were used to assess the treatment

effects of the objective test measures. In addition, a simple two-cell comparison of the levels of lecture format for the free recall measure was analyzed by a *t*-test. No significant differences ($p<.05$) were found for either performance measure. Two factors considered important to the nonsignificant outcomes of this study were the characteristics of the learning disabled subjects (language, cognitive, and motivation deficits) and the settings (special education classrooms) in which the study was implemented. Suggested modifications to LPP for future research include structuring the pause activity to provide a step-by-step procedure for students to follow, provide more thorough instruction, incorporate self-management techniques, and implement LPP in mainstream classes.

CHAPTER I
INTRODUCTION

In the last 15 years, programs for learning disabled (LD) adolescents have focused on helping LD students succeed in mainstream programs. Consequently, the LD student spends the majority of the day in regular classes and attends special education classes part-time. Typically, the special education teacher provides support to LD students through basic skill remediation and/or through tutoring in the subject areas. Implicit in this arrangement is the assumption that LD adolescents will achieve the objectives of the secondary program and earn a high school diploma (Deshler, Schumaker, & Lenz, 1984). Unfortunately, many LD adolescents are not achieving the objectives of the secondary curriculum and the majority drop out of high school without receiving a diploma (Levin, Zigmond, & Birch, 1985).

Failure in school and the resulting drop-out rate have become major concerns. In the school, demands for accountability and concern for student progress have caused educators to seek interventions that facilitate the handicapped learner's success in the mainstream. Moreover, LD adolescent drop-outs are regarded as potential welfare

recipients and at-risk for delinquency. Steps must be taken to break the cycle of failure and provide success for the LD adolescent. To develop successful instructional interventions for LD adolescents, school failure must be thoroughly analyzed. Ecological theory deserves consideration in examining the problem.

Ecological Perspective

In ecological theory, behavior is considered to be the result of the interaction between the organism and environment (Mercer, 1983). When applying ecological theory to school failure and drop-out of LD adolescents, failure would be perceived as resulting from the interaction between the LD student and the school environment. What is it about LD adolescents and mainstream classes that interact to result in failure? The staff of the Institute of Research on Learning Disabilities (IRLD) at the University of Kansas applied ecological theory in collecting data on the characteristics of LD adolescents and the setting demands of secondary mainstream classes. The results of this data collection are discussed in the following sections.

Characteristics of LD Adolescents

Despite the heterogeneity of LD students, some common characteristics can be identified. Academically, most LD adolescents demonstrate deficiencies in reading and writing

skills. From the research conducted at the IRLD, Deshler (1984) suggested that LD adolescents plateau academically at about the fourth or fifth grade level. In addition to difficulties in written language, Schumaker and Deshler (1983) reported that LD adolescents do not possess adequate listening skills. This deficiency in processing oral language affects the comprehension of simple directions as well as lecture presentations. According to Carlson and Alley (1981), LD students record only 41% of key information from a lecture, whereas their high achieving peers record up to 79% of the key information. The work habits of LD students are also poor. They fail to use study strategies or think of ways to complete difficult tasks. For example, when a nonhandicapped student encounters a problem in completing an assignment, the student will usually attempt to formulate a plan to complete the task. However, a LD student frequently will not formulate a plan. Deshler (1984) reported that this passivity, or lack of effort, points out the LD adolescent's lack of motivation and independent work habits. It is a continual source of puzzlement to educators and parents whether the lack of motivation limits the LD student's effort on a task, or the inability to complete the task stifles motivation. In summary, a profile of a LD adolescent describes a passive learner with deficient academic skills and low motivation. How do these

characteristics interact with the requirements of the mainstream class?

Setting Demands

In the secondary mainstream class, requirements include acquisition of content and performance on evaluation measures. Content is primarily conveyed via reading, lecture, and independent seatwork. Schumaker, Sheldon-Wildgen, and Sherman (1980) found that seatwork occurred during 48% of the class period, whereas lecture occurred during 18% of class time. If independent seatwork and lecturing are the main activities in which content is presented, the LD adolescent must be able to work independently to gain information from written materials and oral presentations. The second important requirement is evaluation. Evaluation refers to activities that sample the students' knowledge and mastery of class objectives. In content-oriented classes, this usually means tests (objective and essay formats) that rely on reading and writing skills.

Considering the demands of mainstream classes and the characteristics of LD adolescents, it is not difficult to foresee the problems encountered when low achieving, unmotivated LD students interact with class expectations of independency and academic proficiency. Failure is inevitable without effective interventions.

Interventions

Traditional interventions, such as remediation and tutoring, have not been successful in helping many LD students succeed in mainstream classes (Deshler et al., 1984). To help the LD adolescent, the learning strategies approach was developed by Deshler and his colleagues at the IRLD. The learning strategies approach teaches the LD adolescent techniques, principles, or rules which enable learning, problem solving, and the independent completion of tasks. The results of present research indicate that learning strategies have been successful in helping LD students gain information from written material and demonstrate knowledge through written expression (Schumaker et al., 1981). However, strategies to aid the LD adolescent to gain information from orally presented information are needed. Since lecturing is the second most predominant class activity in secondary level classrooms, it warrants further attention.

To compensate for the loss of information during lecture, Rowe (1976) proposed that the lecturer pause for 2 to 3 minutes at least three times during a class lecture. During the three pauses, students are encouraged to share knowledge and notes of lecture content. This 2- to 3-minute pause for sharing knowledge and notes not only allows the student to fill in lost information, but the

interaction provides better comprehension and retention of lecture content.

The lecture-pause procedure (LPP) has been successfully implemented with college students in the acquisition and retention of course content (DiVesta & Smith, 1979; Rowe, 1976; Ruhl, Hughes, & Schloss, 1987). At the secondary school level, Hughes, Hendrickson, and Hudson (1986) found LPP effective in increasing the factual recall of high- and low-achieving students in mainstream classes. Although LPP has not been implemented with handicapped students, the procedure has the potential for aiding LD adolescents in acquiring the subject area content required to meet class objectives.

In summary, educators have become increasingly concerned about the LD adolescent's failure to meet the requirements of the mainstream programs. An ecological approach to investigating student failure has led to the conclusion that LD adolescents do not have the skills or motivation to independently acquire content through written text or oral presentations. Learning strategies have been used to teach LD adolescents how to gain information from written material; however, interventions to aid the LD adolescent with acquiring lecture content have not been forthcoming. The LPP is an intervention that has the potential for helping the LD adolescent acquire content from lecture presentations.

Statement of Purpose

This study was designed to investigate the effectiveness of LPP in aiding LD adolescents to acquire lecture content. Specifically, performance measures were collected to address the following questions:

1. Will students in the experimental group demonstrate higher short-term recall of lecture content than students in the control group?
2. Will students in the experimental group demonstrate higher performance than students in the control group on objective tests given immediately following the lecture condition and 3 weeks later?
3. Will there be an interaction for differences between experimental and control groups on the immediate and delayed objective test measures?

Definition of Terms

Ecological theory. Ecological theory stresses that behavior is the result of the interaction between organism and environment (Mercer, 1983).

Information processing theory. Information processing theory seeks to explain what happens in the human mind during the stages of acquisition, storage, and retrieval of information (Reed, 1982).

Learning disability (LD). Learning disability refers to a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, write, spell, read, or do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps; mental retardation; emotional disturbances; or environmental, cultural, or economic disadvantages.

Learning strategies. Learning strategies are techniques, principles, or rules which enable a person to learn, solve problems, and complete tasks independently.

Learning strategies model. The learning strategies model developed by the Institute for Research on Learning Disabilities at the University of Kansas refers to a comprehensive intervention program for low achieving and LD adolescents. The learning strategies model includes curriculum, instructional, and organizational components.

Lecture-pause procedure (LPP). In LPP, the lecturer pauses for 2 to 3 minutes at least three times during a class lecture. During the pause, students are encouraged to share notes and discuss the lecture content.

Short-term recall. Short-term recall refers to the amount of lecture content freely remembered (uncued) by the student immediately following the lecture presentation.

Delimitations

The scope of this study was delimited in three ways. The study was implemented at three senior high schools in Pinellas County Public Schools which is located in the west central portion of Florida. Furthermore, only special education resource programs offering a General Science 9 course required for graduation were included in this investigation. Finally, all the subjects were identified as learning disabled according to Florida Department of Education guidelines. There were 20 males and 6 females with a mean age of 15. All subjects were in the ninth grade.

Limitations

This investigation was limited by three conditions beyond the control of the researcher. The sample of students selected from Pinellas County Public Schools may not be representative of students from other areas of the United States. In addition, the students were identified as learning disabled according to Florida Department of Education guidelines and the decision of placement teams of

the Pinellas County Public Schools. Finally, the maximum number of lecture days for a given content area was 2 days.

In the next chapter, a thorough review of the literature is presented. The limitations of cognitive processes in acquiring information from lectures and the theoretical and experimental support for investigating LPP with LD adolescents is examined. In Chapter III, the procedures followed in conducting this investigation are presented, including hypotheses, descriptions of subjects, setting, instrumentation, procedures, and data analysis. In Chapter IV, the results of this study are reported and, in Chapter V, the results are discussed.

CHAPTER II
LITERATURE REVIEW

The purpose of this chapter is to examine the theoretical foundations, as well as experimental research specifically related to LPP. The primary justification for pausing during lectures is to allow students to recoup lost information, resulting from mental lapses, by sharing notes and knowledge of the lecture. The interaction that occurs among the students provides additional benefits--as students interact, the learning process is activated and greater understanding and retention of the lecture content occurs. The literature review is organized according to the factors of cognitive processing related to acquiring information from lecture, effects of student interaction during pauses on lecturing, experimental research on LPP, and the relevance of LPP to LD adolescents.

Cognitive Processing Factors

The loss of information during lecture presentations is explained by Rowe's description of mental lapses and the work of information processing theorists. According to Rowe (1976), mental lapses occur when a student's ability to absorb information from lectures is overloaded.

Although mental lapses are momentary, the interruption in the flow of ideas can result in a substantial loss of information. Rowe identified four types of mental lapses that may randomly occur throughout a lecture period:

1. A mental lapse can occur when the lecturer shifts the context of the topic or use of symbols, and a student may fail to recognize the shift. The lag in shifting may only be a minute or two, but recovering the chain of reasoning may be difficult.
2. A mental lapse can result when the information is difficult for the student to grasp. This problem happens when the listener has difficulty relating the content to what he or she already knows.
3. A mental lapse can occur when the lecture content sets off an independent chain of thought. Again, the lapse may be momentary, but information and the gist of the lecture are lost.
4. Finally, when lecture is dense with new and complex content, a mental lapse occurs as the mind fatigues and closes down for short periods. Further understanding of lost information and mental lapses can be found in an information processing perspective of learning acquisition.

In recent years, some learning theorists have gone beyond the earlier associationist-behavioral approaches to learning theory and have favored an information processing

perspective (McKeachie, 1978). Information processing theory has evolved from early cognitive psychology and analogies to computer technology (Reid & Hresko, 1981). In information processing theory the stages of acquisition, storage, and retrieval of information are explained (Reed, 1982).

To acquire and store information from a lecture, the individual relies on attention and memory mechanisms to process information (Fuhrmann & Grasha, 1983). Attention and memory components are often viewed as separate and distinct functions. However, Torgeson (1981) suggested that when learners are motivated toward a goal, such as learning from a lecture, attention is an important part of information processing. Actually the relationship between attention and processing is often interdependent. If the student is not paying attention to the lecture, information cannot be processed. Conversely, if the student is having difficulty processing content, attention may lapse. Either way, information is lost and the limitations of an individual's ability to process information are observed.

Attention Capacity

Limited attention capacity implies that individuals can only do one thing at a time. Yet, most of us can recall a time that we navigated our way home while totally engrossed in conversation. Was our attention simultaneously focused on both the conversation and finding

our way home? Underwood (1976) has observed that attention is not required for predictable events (navigating our way home); however, attention is required for processing unpredictable information (hopefully, the conversation). This may explain the loss of information when unpredicted activities or thoughts interfere with attention to the lecture.

H. C. Ellis (1978) has summarized experiments of dichotic listening tasks that support the observation of limited attention capacity. In studies of dichotic listening a single primary message is presented along with one of several secondary messages. Although the listener will often notice certain things about the secondary message, most of the attentional capacity is required to process the primary message. In the case of the lecture, a mental lapse may occur when the student's attention is diverted by competing thoughts or notetaking. Possible loss of information can also be explained by examining how incoming information is encoded and stored in the memory components.

Memory Capacity

In the multi-stage storage concept of memory, external information is processed through three memory components--the sensory register, short-term memory, and long-term memory. The sensory register is the first to scan the external stimulus. According to H. C. Ellis (1978),

despite the large capacity of the sensory register, only a fraction of the incoming information is attended to and passed on to the short-term memory.

The short-term memory corresponds to the buffer in a computer. It holds a limited amount of information that can be held for immediate use, processed for long-term memory storage, or dropped from the store. According to Atkinson and Shiffrin (1979), information is maintained, on the average, in the memory store about 15 to 30 seconds. If the information is to be processed (sorted, coded, and organized), Rowe (1980) estimated that it will take approximately 5 to 10 seconds to chunk the information and direct it to a site for storage. This storage may be internal (long-term memory) or external (notes). In the context of a lecture presentation, it is easy to anticipate the limitations of the processing system. There are several variables that influence the efficiency of processing information.

Presentation rate. The limited capacity of the short-term memory may be strained during a lecture when the presentation of content is faster than the student's ability to process the information. Rowe (1982) suggested that a mental lapse occurs when this overload of processing occurs. The existence of this problem is further supported by Moran's (1980) investigation of oral language demands of secondary classrooms. She observed a mean of 10 morphemes

per utterance in teacher talk. This exceeds the nine morphemes per utterance identified by Miller (1956) as the maximum number which could be processed without loss of data.

Prior knowledge. The efficiency and rate at which information can be processed during a lecture is also affected by the student's prior knowledge of the content material. Piaget (1963) postulated that the learner assimiliates familiar knowledge into existing mental structures. However, unfamiliar knowledge must be accommodated by reorganizing mental structures. Rowe (1982) stated that unfamiliar information saturates the buffer (short-term memory) more quickly than familiar information due to the additional time required to process the information. This overload of the buffer results in a mental lapse. Since the short-term memory must be cleared before new information can enter, incoming information is lost, decaying in the sensory register.

Information density or complexity. The density of new or complex information in a lecture will also affect the rate of processing information which could cause an overload or mental lapse. Aiken, Thomas, and Shennum (1975) compared high- and low-density lectures by preparing two versions of the same lecture. The high-density version contained twice as many information units as the low-density lecture while preserving approximately equal number

of words. Tests of recall indicate that the high-density groups recalled proportionately less than the low-density groups. Rowe (1980) suggested that material dense with information units fatigues the mind faster and the mind responds to the situation by closing down for short periods.

To summarize, the lecture is a limited instructional procedure in which information is one-way and transitory. The possible limitations in processing information from a lecture presentation have been examined. Such variables as attention capacity (e.g., competing thoughts or activities) and memory capacity (e.g., rate of presentation, prior knowledge, density of material) impact on the rate and efficiency with which the student can process information from the lecture. When the processing system is overloaded, incoming information is lost. Rowe (1976) proposed several intermittent pauses during the lecture to allow students the opportunity to recoup this lost information. With additional information gained during the pause, it is logical to predict that immediate recall of lecture content will increase.

The Pause Interaction

A second model of information processing was proposed by Craik and Lockhart (1972). Rather than viewing the memory system as discrete multi-stage components, it is

conceptualized as a continuum of levels in processing. This means that stimuli are analyzed at a number of levels. The range of superficial processing to deeper level processing is purported to affect how well and durable material is learned. This is an important distinction because the earlier review of mental lapses and related information processing theory focused on quantity of information--how much is lost and why. Certainly this is an important factor, but it is only the first step in the learning process. Next, information should be understood and retained by students. The levels of processing theory appear to focus more on quality of information acquisition. Houston (1981) stated that shallow processing occurs when the individual attends to the physical nature of the stimuli (e.g., how it looks or sounds) which results in weak learning. However, when information is processed at a deeper, or semantic level, comprehension is required. In addition, the more deeply the information is processed, the more durable is the memory trace and thus the learning. Most individuals can relate learning experiences to this conceptualization of deep level processing. When initially exposed to some new and different material, it may have seemed incomprehensible, but the more one works with it, the more it is understood and the more is remembered. Time spent with the material is not always the important factor. For example, if an

individual already has prior knowledge of the material, he will more quickly process the information to a deeper level.

How then is information deeply processed, and how does this theory relate to LPP? During the pause, students not only regain information lost from the lecture, but the interaction among students allows for greater comprehension and retention of material. Cognitive theorists state that active learning is more efficient than passive learning, such as listening (McKeachie, 1978). Opportunities to verbalize, receive immediate feedback, and elaborate have demonstrated benefits to the learner. These activities or applications of cognitive learning theory help explain why the interaction during the pause enhances comprehension and retention of lecture material.

Verbalization

While students in the pause groups are comparing notes to see what information they might have missed, the information is inevitably discussed or verbalized. This immediate verbal rehearsal of content reinforces new facts and concepts. By encouraging students to verbalize their learning, oral language becomes an active instrument in reorganizing perceptions, inferences, and conclusions (Moran, 1980). This means that students go beyond hearing without understanding because talking about the information with peers requires that the content be comprehended.

Verbalizing also shortens the learning process. For example, McKeachie (1978) stated that the learning process is accelerated when a skill is practiced mentally and verbally.

Feedback

As the interaction proceeds, questions, explanations, and notes are exchanged among students. Rowe (1976) observed that this feedback decreases the chance of students learning incorrect or partial concepts. The added benefit is that feedback and explanations are provided in the peer language which is more easily understood.

Elaboration

When students verbalize information and receive feedback on facts and concepts, they are elaborating on the information first presented by the lecturer. Fuhrmann and Grasha (1983) pointed out that by providing students the opportunity to elaborate on content, information is processed at a much deeper level. This means that the content is more meaningful and can be assimilated or accommodated into existing cognitive structures. Bjork (1979) suggested that variable encoding will help students to elaborate. Variable encoding is when the same information is presented in two different contexts. In the case of LPP, information is first presented by the lecturer and then it is again covered during the pause by peers in their own language.

In summary, the interaction among students during the pause provides for better comprehension and retention of lecture content. Opportunities to verbalize information, receive feedback, and elaborate on lecture content aid the learner in processing and learning the lecture material.

Lecture-Pause Research

The lecture-pause procedure was originally introduced by Rowe in 1976. In publications and presentations, Rowe (1976, 1980, 1982) discussed the effectiveness of the lecture-pause procedure with college science classes. However, sufficient design information and data have never been made available for analysis, so full acceptance of the lecture-pause procedure is not warranted. Since Rowe's "invitation for inquiry" in 1976, there have been three studies on the lecture-pause procedure (two published and one submitted for publication). These studies are reviewed, and their contributions to knowledge on LPP, particularly to this study, are reported herein.

College Level/High Achievers

In the first published study, DiVesta and Smith (1979) investigated the importance of two variables in LPP, location of pause and activity during pause, on recall of lecture content. One hundred eight college students listened to a 21-minute audio-taped lecture according to one of nine treatment conditions. No notes were allowed.

The 3 x 3 x 2 factorial design provided for three-pause locations (6 minutes at prelecture, three 2-minute interspersed pauses, and 6 minutes at postlecture); three pause activities (puzzle activity, individual review, and discussion); and immediate and delayed measures of retention (free recall and cued recall). A mixed analysis of variance was used to analyze the data.

Significant interactions were indicated on cued recall measures for Pause Location x Pause Activity, Pause Activity x Test Delay, and Portion of Test x Test Delay. Analysis of specific differences showed that students in the interspersed pause and discussion treatment group received significantly higher scores, retention loss was significantly less for the discussion group, and the greatest loss of information was on the first portion (first third of lecture) of the test. On free recall measures, significant interactions were found in Pause Location x Activity and Pause Location x Pause Activity x Test Delay. Analysis of specific differences indicates that the highest scores on immediate and delayed recall were for the interspersed pause and discussion group.

DiVesta and Smith (1979) concluded that use of interspersed pauses with discussion enhances achievement from listening to lecture. Simply pausing during lecture is insufficient and may even interfere (e.g., puzzle activity). The authors stated that it was important to

note several points: first, pauses occurred at natural breaking points in the lecture, thus allowing learners to encode information in meaningful units; second, lecture portions were short (about 7 minutes long); and, third, discussion provided opportunity for rehearsal.

The most valuable contribution of this research is the examination of the pause location and pause activity variables which reaffirm the use of interspersed pauses and student interaction to enhance lecture recall. The use of an audio-taped lecture that controlled for variances in the lecture presentation allowed examination of these factors. In addition, immediate and delayed recall measures further supported Rowe's assertion of better retention. Clearly this study supported all of Rowe's contentions in acceptable research form. However, the study is limited by failure to simulate real lecture conditions, that is, a single audio-taped lecture only 21 minutes long, no notes allowed, and only recall measures of content acquisition. With strengths and weaknesses considered, this study provided an important first step investigating the effectiveness of LPP, and it sets the stage for the next research step to examine LPP under more realistic conditions.

Ruhl et al. (1987) provided the next research regarding LPP by examining its effectiveness in five live lectures for college students. Seventy-two college

students, in four special education introductory courses (two LD and two behavior disorders [BD]), participated in either a LPP or control group. A 2 x 2 factorial analysis was used to examine the effects of LPP on BD and LD classes on free recall and comprehensive test performance. Results on free recall scores indicated that the LPP groups scored significantly higher than the control groups. However, on comprehensive test measures both the BD classes outscored the LD groups, although combined LPP groups still scored significantly higher than the control groups.

Ruhl et al. (1987) have provided a valuable extension of knowledge on LPP by demonstrating its effectiveness in realistic lecture conditions (i.e., live and repeated presentations lasting at least 45 minutes with students taking notes and measures of comprehensive test performance). In addition, believability of the findings is enhanced by adherence to good research procedures. DiVesta and Smith (1979) and Ruhl et al. (1987) indicated strong support for the use of LPP in improving the lecture recall and test performance of college students. However, these findings cannot be generalized to all student populations, and further investigations of LPP are warranted (e.g., include subjects of different ages, abilities, and motivation levels). College students are considered to be high level learners and do not represent a normal distribution.

Secondary Level/Low and High Achievers

In the third study, Hughes et al. (1986) investigated the effectiveness of LPP in increasing the factual recall of lecture content by low- and high-achieving students in a seventh grade science class. Eight students (four low-achieving and four high-achieving) were selected in each of two science classes. Each class followed a single subject AB design which had six lectures in baseline (no LPP) and six lectures in intervention (LPP). The intervention provided for a pause every 6 to 8 minutes. During the pause, students were assigned to triads with each group having one low-achieving student and one high-achieving student. Direct instruction at the beginning of the intervention phase trained students how to interact appropriately during the pause. Factual recall was measured after each lecture in baseline and intervention. Three minutes were allotted for students to write down as many facts as they could recall.

Results were determined on the basis of visual analysis of the differences between baseline and intervention phases for each subject, either via the trend line on graphed data or mean and median scores. Seven of 8 low-achieving students showed improvement in the number of facts recalled, and 3 of 8 high-achieving students showed improvement. The authors concluded that this initial investigation shows particular benefits to low-achieving

students. It was postulated that factors influencing gains in recall were opportunities to verbalize lecture content, active participation in pause discussions, and the cooperative learning situation with peers.

Strengths of this study were the live lectures with repeated measures of the dependent variable and the use of direct instruction to train students how to interact appropriately during the pause. However, the use of an AB design makes conclusions tentative since there may be other explanations for the gains in factual recall. The effects of improved lecture recall on class achievement would have enhanced the value of this LPP study. The study of Hughes et al. (1986) does contribute to knowledge of LPP in several ways. Most important is the use of LPP with a new population of younger, multi-level learners. It is curious that high-achieving students did not do better considering results at the college level. However, for the purposes of this study on LPP, the stronger gains by low achievers was encouraging. Because of the similarities between low-achieving and LD students (Ysseldyke, Algozzine, Shinn, & McGue, 1982), the benefits to low achievers were anticipated for LD. More specifically, the fact that the low-achieving students were motivated to participate in the pause activity, and then showed the subsequent gains with LPP, is more encouraging.

In summarizing this section, there appears to be sufficient research support for the continuing investigation of LPP. Benefits for college students are clearly indicated by gains in factual recall and test performance on lecture content (DiVesta & Smith, 1979; Ruhl et al., 1987). In addition, the initial investigation by Hughes et al. (1986) with low-achieving and high-achieving adolescents provides encouragement for the use of LPP with secondary level students experiencing difficulties acquiring information from lecture presentations. In the next section, the relevance of LPP for LD adolescents will be examined further.

Relevance of LPP for LD Adolescents

In this section, the appropriateness of using the LPP with LD adolescents is discussed. First, the cognitive processing difficulties of LD students are reviewed to indicate the need for LPP in recouping lost information. Then the instructional incentives created by LPP, and their importance to the LD adolescent, are discussed.

Cognitive Processing Difficulties

Rowe's (1976) primary rationale for pausing during a lecture presentation is to allow students to regain information lost as a result of mental lapses. Rowe postulated that mental lapses occur when the student is distracted or has difficulty cognitively processing the

information from the lecture. For the LD student these cognitive limitations in processing information are not only present, but are more severe. Attention and memory mechanisms identified earlier as fundamental to processing information are areas in which LD students have demonstrated deficits (Reid & Hresko, 1981; Schumaker & Deshler, 1983). The LD student is characteristically less attentive in the classroom (Hallahan, Kauffman, & Lloyd, 1985) and, in tasks requiring high voluntary attention (such as the lecture), LD students will perform at a much lower level than their peers (Krupski, 1981). This is evidenced by the small amount (41%) of key information recorded in lecture notes by LD adolescents (Carlson & Alley, 1981). Why LD students have these difficulties has been given considerable attention.

There is some evidence that the LD students' attention and memory deficits lie in the actual processing of information (i.e., organizing information for storage and transferring information from short- to long-term memory). However, where the deficit actually occurs in the processing has not been determined due to the lack of carefully controlled studies. Part of the difficulty with research occurs because learning tasks, such as acquiring information from a lecture presentation, are an integrative and reciprocal effort of attention, memory, and motivation (Krupski, 1981). So far, research technology is not

sophisticated enough to tease out the individual factors of complex learning processes. Regardless of cause, the deficits in processing do exist and LPP does offer a positive intervention.

Incentive

The benefits of LPP in recouping lost lecture information and providing better comprehension and retention of lecture content have been presented. Of particular importance to the LD learner is the incentive to become actively involved in the learning process. The LD student is typically perceived as a passive learner, inactive and uninvolved in the learning process (Torgeson, 1981). This means that, given awareness of lost information, it is unlikely that the LD student would initiate steps to recoup the lost information. There is some evidence that increased incentives for performance can affect the manner in which LD students process information (Torgeson, 1981; Wiens, 1983). In LPP, peer collaboration on lecture content has great appeal to the adolescent.

Mercer (1983) has observed that the adolescent is influenced more by the peer group than either children or adults. This strong influence makes the peer interaction in LPP a powerful instructional incentive. While LD students may not initially contribute to lecture discussion during the pause, it is predicted that the combination of direct instruction and peer interaction will provide the

incentive and skill to participate. Once the LD student is participating, the benefits of improved recall and comprehension of lecture content will provide a second reinforcer for participating in LPP.

In conclusion, the process deficits of the LD adolescent and the demands of the lecture are incongruent and set the stage for failure. The LPP provides digestible segments of lecture and a pause activity that is conducive to learning.

Summary

This chapter is a review of the literature related to LPP. Information processing theory has been cited on how attention and memory systems can be overloaded in a lecture presentation, thus resulting in the loss of information. However, opportunities to verbalize, receive feedback, and elaborate on lecture content during the pause provide for better comprehension and retention of lecture material. Experimental research on LPP has been reviewed, and there is sufficient support for the proposed investigation. Specifically, the benefits of LPP for college students are indicated by gains in recall and test performance, and initial research with adolescents shows gains in recall. The stronger gains by low achievers were particularly encouraging for pursuing the use of LPP with LD adolescents

because it was anticipated that students would be motivated to participate in the pause interaction and, thus, would reap the benefits of actively processing lecture material.

CHAPTER III
METHOD

The method described in this chapter follows experimental research procedures to examine the effects of the lecture-pause procedure on three dependent variables. This chapter is divided into seven sections: hypotheses, subjects, setting, instrumentation, procedures, design, and data analysis.

Null Hypotheses

The following null hypotheses were tested at the .05 level of significance:

H1 There will be no statistically significant difference between the experimental and control groups on short-term free recall of lecture content summed across two lectures.

H2 There will be no statistically significant main effect for differences between the experimental and control groups on objective test performances.

H3 There will be no statistically significant interaction for differences between experimental and control groups on the immediate and delayed objective test measures.

Subjects

The sample consisted of 26 subjects enrolled in general science 9 classes offered by special education departments in thre Pinellas County Public Schools. Each subject had been identified as meeting the criteria for LD outlined by the State of Florida. The description of subjects is based on guidelines recommended by educators in the area of LD (Smith et al., 1984). Table 1 contains a list of subject data that were easily tabulated: sex, age, race, social economic status (SES), IQ, reading, and spelling achievement. Teachers' estimated a student's SES on a scale of low (1), middle (2), and high (3). All achievement scores are based on a Wide Range Achievement Test measure and are considered estimates of reading and spelling abilities. All intelligence quotients (IQ) are based on the Wechsler Intelligence Scale for Children-Revised (WISC-R) full scale IQ score.

Additional information about the subjects, considered important to study outcomes, was the low motivation levels of many students. In each class, there were students who were totally apathetic toward the lesson (e.g., slouched in chair, head turned away from the lecturing teacher, no notetaking, no participation in the pause groups).

Despite this, if the subject took the free recall and objective test measures, the subject was included in the

Table 1
Subject Data

	Experimental group	Control group
Numbers		
male	10	10
female	3	3
total	13	13
Age		
mean	15.2	15.4
SD	.4	.7
Race		
Anglo	11	12
Black	2	1
SES		
mean	1.7	1.7
SD	.4	.6
IQ		
mean	96.4	91.2
SD	11.7	11.4
Spelling Achievement		
mean	4.0	4.5
SD	1.3	1.5
Reading Achievement		
mean	5.2	5.2
SD	1.6	1.3

SD = standard deviation

sample. Consequently, all subjects were present for the four tests (two recall and two objective tests) measuring the dependent variables of the study.

Setting

The research was conducted at three high schools in Pinellas County Public Schools: Dixie Hollins, Pinellas Park, and Tarpon Springs. Each school served approximately 2,000 students. The lecture-pause procedure was implemented in four general science 9 classes offered by the special education departments. These classes were required for high school graduation with a standard diploma. Of the four classes participating, two were control groups of 8 and 9 students, and two were experimental groups with 12 and 13 students. The classrooms were of average size with individual student work areas.

Instrumentation

The dependent variables in this study were short-term factual recall and performance on a comprehensive objective test. The factual recall was administered at the end of each lecture. The objective test was first administered immediately following the two lectures and again 3 weeks later.

Free Recall

In studies of information retained from lectures, the free recall test is a standard instrument (Aiken et al., 1975; DiVesta & Gray, 1973; DiVesta & Smith, 1979). The free recall test is a straightforward way of measuring retention (H. C. Ellis, 1978) and was used in this study at the end of each lecture with a 3-minute timing. Free recall measures were used with experimental and control groups for the two lectures preceding intervention (training) and the two intervention lectures. In the free recall test, students were instructed to write down as many facts presented in the lecture as they could recall during the 3 minutes of allotted time.

Objective Test

The objective test measure was developed by three teachers of LD adolescents in Pinellas County Public Schools teaching General Science 9 (see Appendix A). In this study, the purpose of the objective test was twofold. First, it provided important information on how well the students understood the lecture material. The objective test was also important because it most nearly corresponded to traditional school measures of student learning. The objective test was administered to students, in experimental and control groups, the day following the two intervention lectures, and the same test was given 3 weeks later.

Procedures

Four General Science 9 classes were offered at three Pinellas County Public Schools. The four classes were randomly assigned to either the experimental or control condition. The remainder of this section is organized according to procedures for the training and experimental conditions. Adherence to the described procedures was assured by the presence of the researcher in all classes for training and intervention phases.

Training

Two lectures were allotted to prepare students and teachers for the experimental condition. For teachers implementing the lecture-pause procedure, there was an opportunity to practice pausing in the lecture presentations; however, the main focus of this 2-day period was training students. Since students in the experimental and control groups took a 3-minute free recall test at the end of each lecture, it was anticipated that some instruction and practice would be required in that type of test-taking. In addition, students in the experimental groups were trained how to interact appropriately during the pause (i.e., questions to ask and information to share, rules for interacting). Direct instruction procedures, as outlined by Mercer and Mercer (1985), were followed for both activities. Appendix B provides specific lesson plans and the time frame followed for each activity.

Experimental Condition

Two lectures were planned for the experimental condition. Teachers in the experimental and control groups covered the same content outline for each lecture (Appendix C) and used the same overhead transparencies/student handouts (Appendix D). Each lecture was approximately 30 minutes long and was followed by a 3-minute free recall test.

Control groups. Using the lecture outline, the two teachers in the control classes presented the lecture straight through without pausing. To balance for the extra 6 minutes used for the three pauses in the experimental groups, teachers in the control groups were instructed to allow students 3 minutes before the lecture for students to prepare individually for the lesson and 3 minutes at the end of the lecture to review notes individually (see Figure 1). The 3-minute review was immediately followed by a 3-minute free recall test.

Experimental groups. The lecture outline for these teachers was divided into three equal segments so that both teachers paused at the same point for 3 minutes. As noted in Figure 1, the sequence consisted of three 8- to 12-minute lecture segments alternating with three 3-minute pauses.

Rowe (1980) suggested that there be a minimum of three students in each pause group in order to provide sufficient

LPP:	Lecture	→	Pause	→	Lecture	→	Pause	→	Lecture	→	Pause
	10-12"		3"		10-12"		3"		10-12"		3"
No LPP:	Prepare	→	Lecture	→	→	→	→		Review		
	3"		30-36"						3"		

Figure 1
Lecture Sequence for Experimental and Control Groups

variety in the notes and interpretations of what was said in the lecture segment. This suggestion was followed, with pause groups of four students formed when necessary to balance the class.

During the pause, no questions were directed at the teacher. Students were instructed to share notes and talk about the lecture content (identifying the main points of the lecture segment, as well as important vocabulary words and facts). Although the researcher modeled how to interact during the pause and training was provided, student skills and interactions were not specifically structured or measured.

Scoring. For the free recall test, student papers were scored by the researcher with one point given for each correct fact:

1. Appropriate nouns (e.g., lungs, skin), descriptive verbs (e.g., eliminate, circulate), and related adjectives or adverbs.
2. An extra point was given if the subject wrote a phrase or sentence, as opposed to one-word responses (e.g., kidneys are bean-shaped). Examples of scored free recall responses are

```
  1
heart = 1

     1         1
respiratory system = 2

   1         1       1
skeleton protects body + 1 = 4
```

A second scorer, who was familiar with the lecture content, randomly selected 15 subject papers and scored them according to the above guidelines. Interscorer agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements. Agreement on scoring the 15 papers was at 92%. The number of facts recalled by each student (points) was summed across the two lectures to produce a single cumulative measure of recall.

For the objective test, the researcher and three teachers compared the lecture content and test to establish content validity and found the test accurately and fairly sampled the lecture content. The test contained

approximately 10 questions for each body system presented through lecture. The number of correct responses on the test was totaled for each student.

Design

A 2 x 2 factorial design with one between and one within group comparison was used in this study to assess the treatment effects of the objective test measure (Figure 2). In addition, a simple two-cell comparison of the experimental and control groups' free recall measures was used.

		Performance Over Time	
		Immediate	Delayed
Lecture Format	Pause	X_{111} X_{112}	X_{122}
	No Pause	X_{211} X_{212}	X_{222}

X--1 = Total recall scores
X--2 = Objective test scores

Figure 2
A 2 x 2 Factorial Design

Data Analysis

For the objective test measures (immediate and delayed), a two-way analysis of variance (ANOVA) was used. The ANOVA was considered the most appropriate statistical procedure for the objective test measures because it allowed investigation of any differences between the two test measures (McMillan & Schumacher, 1984). A *t*-test was used to analyze the differences between the experimental and control groups on the recall measure. The *t*-test is the most common statistical procedure for determining the level of significance when two means are compared (McMillan & Schumacher, 1984). For both the ANOVA and *t*-test, a .05 level of confidence was established for rejection of the null hypotheses.

CHAPTER IV
RESULTS

The purpose of this study was to investigate the effect of LPP on learning disabled adolescents' short-term recall of lecture content and immediate and delayed performance on a comprehensive objective test covering lectures. To this end, three hypotheses were formulated and tested. This chapter contains the results of statistical analyses of data obtained in this investigation. The chapter is organized according to the three hypotheses that guided this investigation.

H1 There will be no statistically significant differences between the experimental and control groups on short-term free recall of lecture content summed across two lectures.

Once numbers of facts recalled from each lecture were summed for each student, a mean and standard deviation scores were computed for the experimental and control groups (see Table 2). A *t*-test was used to test the hypothesized effect of LPP on the short-term free recall of lecture content. Comparison of the mean recall scores of the experimental and control groups were made using a *t*-test in order to determine the probability that the means

Table 2
Mean and Standard Deviation Scores for Recall and Objective Test Measures

	Experimental group		Control group	
Measure	Mean	SD	Mean	SD
Recall	47.5	15.9	37.0	14.5
Objective test (immediate)	44.1	8.5	43.3	8.0
Objective test (delayed)	41.7	7.7	41.0	9.9

were different (McMillan & Schumacher, 1984). Although students in the experimental group did recall more facts on the average than the control group, the total number of facts recalled from the lecture did not significantly differentiate students in the experimental and control groups, $t(12) = 1.2$. These results indicate that peer interaction (during the pauses) did not enable students in the experimental group to recall more facts than students in the control group that reviewed their notes individually.

H2 There will be no statistically significant main effect for differences between the experimental and control groups on objective test performances.

To test the hypothesized effect of LPP on objective test performances of the experimental and control groups, a

two-way analysis of variance (ANOVA) was used. The ANOVA yielded no significant main effect for the lecture format variable as indicated by objective test performance, $F(1,24) = .05$, $p = .82$ (see Table 3). In addition, a mean and standard deviation scores were computed for the experimental and control groups for each of the objective test measures (see Table 2). Performance on the objective test was not enhanced by short lecture segments interspersed with pauses and the related peer interactions, as compared to students' individually preparing for the lesson, listening to the total lecture, and then reviewing their own notes.

Table 3
Summary Table for Two-Way Analysis of Variance Objective Test Performance Over Time

Source	df	SS	F	p
Between subjects				
Treatment	1	6.94	.05	.82
Error	24	3125.54		
Within subjects				
Treatment x Time	1	.02	0.00	.97
Error	24	378.92		

H3 There will be no statistically significant interaction for differences between experimental and control groups on the immediate and delayed objective test measures.

The hypothesized interaction between treatment conditions and objective test performance over time was analyzed with a 2 x 2 ANOVA. No significant interaction between treatment and performance over time was found, $F(1,24) = 0.00$ (see Table 3). The experimental group scored slightly higher on immediate (.77) and delayed (.69) objective test measures. However, the differences between the experimental and control groups on the objective tests were not statistically different from each other.

In summary, all hypotheses regarding the effect of LPP on the dependent variables were retained. In the next chapter, these results are analyzed and discussed.

CHAPTER V
DISCUSSION

The purpose of the present study was to investigate the effectiveness of LPP in aiding LD adolescents to acquire, comprehend, and retain lecture content. Three experimental questions were examined. First, will LD students in the experimental group demonstrate higher short-term recall of lecture content? Second, will LD students in the experimental group demonstrate higher performance on objective tests administered immediately following the experimental condition and 3 weeks later? Third, will there be an interaction for differences between LD students in experimental and control groups on the immediate and delayed objective test measures?

Following guidelines extracted from previous studies on the effectiveness of LPP, procedures were delineated, training was provided, and the intervention was implemented. The LD adolescents in the experimental group did not score significantly ($p<.05$) higher than the control group on free recall and objective test (immediate and delayed) measures. In previous studies (DiVesta & Smith, 1979; Hughes et al., 1986; Ruhl et al., 1987) in which LPP was implemented, student recall of lecture content and/or

objective test performances did increase. Why were outcomes different in this study? Possible factors contributing to the results of this study are analyzed, implications are discussed, and possible modifications for future research with LPP are presented.

Analysis and Implications of Results

Two factors differentiate the current investigation of LPP from previous studies: (a) the characteristics of subjects participating in the study and (b) the settings in which the study was implemented. It is believed that both of these factors contributed significantly to the outcomes of the study. Each factor will be described in terms of its potential impact on the outcomes of this study.

Characteristics of Students

In the current investigation of LPP all participants were handicapped (i.e., diagnosed as learning disabled). In previous investigations of LPP (DiVesta & Smith, 1979; Hughes et al., 1986; Ruhl et al., 1987), none of the participants were handicapped. The importance of this factor to the outcomes of this study is apparent when the learner characteristics of LD adolescents are examined. In Chapter I, characteristics of the LD adolescent were described based on research from the Institute for Research in Learning Disabilities (IRLD) at the University of Kansas. Some of the characteristics that distinguish LD

students from non-LD are language skills, cognitive skills, and motivation levels. Each of these is discussed as they relate to LPP.

Language skills. In order to learn from lecture presentations, oral and written language skills are essential. Students need to be able to attend to oral presentations, comprehend the material, and record appropriate notes. In contrast to normally achieving peers, LD adolescents have difficulty in all of these areas. Schumaker et al. (1980) found that LD students attend to only 26% of teachers' statements of facts, whereas non-LD peers attend to 54%. In addition, Carlson and Alley (1981) found that LD students answered only 64% of listening comprehension questions correctly, as compared to 89% answered correctly by high-achieving peers. Investigation of students' notes indicated that LD students record 41% of key information from lectures, while high-achieving peers record as much as 79% of lecture information. According to these data, the LD adolescent has considerable language difficulties in gaining auditory information.

The language difficulties described above were observed in the subjects of this study. During the lecture students were not always attending to the presentation and they missed writing down key information unless the teacher provided specific verbal cues ("write this down"), along

with visual support (notes on board or labeled diagrams on overhead transparencies). Even then, some students missed information. Moreover, it was apparent that many students could not read the words or understand the information they had written down. Difficulties with attention, comprehension, and written expression can severely impair the LD student's ability to benefit from lecture presentations.

Observations of language difficulties are not surprising. In fact, these deficits provide a rationale for the use of LPP. It is reasoned that during the pause students have an opportunity to recoup lost information resulting from inattentiveness or poor notetaking and to discuss the content they did not understand. This did occur in a few cases, but for the most part, students did not effectively use the pause. They did not actively take steps to acquire or understand the lecture content. Why? It is difficult to determine whether the LD students were unable or unwilling to participate during the pause. It appeared that the students were not motivated and did not care if they learned the lecture content. However, it may have been that the students did not have the cognitive skills to interact effectively during the pause. Both factors are examined.

Cognitive skills. When effective learners are faced with an academic task or problem, they generate strategies

or think of ways to accomplish the task (Doyle, 1983). These cognitive skills, or strategies, assist the learner in acquiring, storing, or retrieving information (Rigney, 1978). Learning disabled students appear to lack the cognitive skills or knowledge of how to strategically use existing skills for learning and problem solving (Ellis, 1986; Hallahan et al., 1985; Torgeson, 1977; Wiens, 1983). These cognitive deficits could be observed in the LPP participants. They did not appear to know how to use the information they had gained from the lecture segment. Even when some techniques were modeled and practiced, most students remained inactive and did not take steps to use the pause for learning. It appears that, in the study of Hughes et al. (1986), a similar instructional procedure successfully aided students' acquisition of the strategies. Why were results different in the current investigation of LPP? Although there were low-achieving students in the study of Hughes et al. (1986), none of the students were LD. It may be that the cognitive deficits of LD students impaired acquisition of the strategies. There is a need to explore a more effective procedure.

In the current LPP study, some of the techniques suggested for students to use during the pause were ask peers for the main idea, significant details and facts, and important vocabulary. These techniques were loosely defined and did not structure the pause interaction for

students. In contrast, strategies developed by the IRLD for LD adolescents provide a step-by-step procedure that leads to task completion. For example, in order to aid paragraph comprehension, the paraphrasing strategy has three steps: (a) read one paragraph at a time; (b) ask yourself what is the main idea and two supporting details of the paragraph; and (c) paraphrase, or put the main idea and details in your own words. Since this structured approach has been validated in many task-specific strategies and has been found to help LD adolescents complete academic tasks independently (Deshler & Schumaker, 1986), it can be concluded that LD students need to have the strategy specifically defined and structured for them. Application of this approach to LPP would require a task analysis of the pause interaction to identify a step-by-step procedure students could be taught to follow. The development of such a strategy is discussed later in the chapter.

With a more clearly defined strategy, instruction can also be more thorough. The previous instructional sequence of model, guided practice and independent practice is still appropriate, but it was too casual without training the students to some measured criterion on the techniques. If students are to use the pause strategy effectively, instruction must be in small increments and data-based (i.e., instruction is based on measurements of student

acquisition of strategy steps). Later in this chapter, further considerations for developing instruction are discussed.

The cognitive deficits, or lack of strategic behaviors, observed in many LD students, do impair their ability to learn successfully. There is evidence that strategies can be taught; however, they must be clearly defined and sequenced for the student to follow. In addition, instruction must be in small increments, and mastery must be required at each step.

Motivation. In the previous section, the LD students' inability to participate during the pause was discussed; however, it may also have been that the students were unwilling to participate. Motivation is essential to all learning tasks because it involves the student's effort to complete the task. Given the years of frustration and school failure, many LD adolescents have serious motivation problems (Deshler et al., 1984; Torgeson, 1977). Typically, LD adolescents are not intrinsically motivated to achieve (Mercer, 1987), and the term "learned helplessness" is often used to describe the LD student's belief that his or her effort will not achieve the desired outcome (Brown, 1978; Seligman, 1975). It may have been that the students did not see how sharing notes or talking about the lecture content would have helped them learn, and there were not other incentives for them to participate.

In the beginning of the present study, no system was planned to provide special incentives (i.e., beyond those naturally occurring in school) or hold students accountable for their work and participation in the study. During training, the students' inactivity during the pause indicated a need to hold students accountable for participation, and the researcher and teachers collaborated on an appropriate system. It was difficult to resolve whether natural reinforcers and contingencies should be used (e.g., praise or grades), or primary reinforcers and artificial systems (e.g., pizza or candy). The teachers noted that offering a candy bar for high recall scores would be very motivating, but in the end, it seemed important to start with natural contingencies. This decision was based both on the desire to observe the effectiveness of LPP under natural conditions and research supporting the initial use of natural reinforcers (Lovitt, 1977).

The recall score and objective test measures were translated into points or a score (whichever system was already in use in the class) that was averaged into the student's final class grade. Since the accountability measure did not markedly change pause participation, these natural contingencies may not have been sufficient to motivate students to participate, and in future investigations of LPP this variable could be manipulated to

provide increased incentives for participation. It may also be that inability (language and cognitive deficits) to participate was a stronger factor and precipitated students' low motivation to participate.

Although it may not be possible to identify whether LD students' motivation was due to "learned helplessness" or lack of skills, steps should be taken to facilitate motivation levels. In addition to reinforcement, or increased incentives, Alley, Deshler, Clark, Schumaker, and Warner (1983) have found that self-management techniques can enhance the academic/cognitive performance of LD adolescents. These techniques allow the student to be more responsible for their own behavior by teaching them to set goals and monitor their own progress in attaining those goals. Application of these techniques to LPP may include setting short-term goals for acquisition of the strategy and long-term goals for improved test scores and the overall course grade. Self-monitoring techniques could include a record system for the student to chart progress towards the goals. These techniques can be incorporated into the instructional procedures.

In summary, the characteristics of LD students, specifically language, cognitive, and motivation deficits, appear to have contributed to the outcomes of this study. Several implications can be drawn from the interaction of LD characteristics and LPP. A strategy should be developed

that provides a step-by-step procedure for LD students to follow. This strategy should be thoroughly taught, requiring mastery at each step, as well as for the total strategy. The motivation levels of students should also be evaluated; and if necessary, increased incentives, goal setting, or self-management techniques should be incorporated in the instructional process.

Setting and Group Composition

A second factor that differentiates the current LPP investigation from previous studies is the settings in which LPP was implemented. This was important because it determined the composition of the pause groups. The skills and effort individual members bring to the pause group can significantly enhance or weaken the productivity of the group. In studies of LPP at the college level (DiVesta & Smith, 1979; Ruhl et al., 1987), the subjects were of high ability and motivation levels. When these students came together in the pause groups, their individual characteristics were complimentary, and learning was enhanced during the pause interaction. In the study of Hughes et al. (1986), subjects ranged from low to high ability. The pause groups were structured so that each group of three had one high achiever and one low achiever. This mixture of ability levels was positive, and all students gained in factual recall. The high and normal achieving peers were seen to positively influence the low

achieving members of the group. In the present study, the pause groups contained all LD students in special education classes. Considering the possible language, cognitive, and motivation deficits each student may have brought to the pause group, it is likely that these factors were compounded and weakened the potential productivity of the group.

Given the positive outcomes of the study of Hughes et al. (1986), it can be hypothesized that the presence of nonhandicapped peers in the pause group would enhance the LD students' productivity. Nonhandicapped peers in the pause group could result in more notes, better comprehension of the lecture content, and a model of appropriate interaction behaviors (e.g., use of strategies, motivation to achieve, sharing) for LD peers to observe and imitate.

Learning by imitation is often provided as a rationale for mainstreaming. Parton (1976) described learning by imitation as the duplication of a model's performance by the production of similar behavior already in the student's repertoire. The potential for learning by imitation is enhanced by the active interaction with normal peers (Bricker, 1978). In the case of LPP, the value of learning skills through imitation is facilitated by the pause interaction when LD students have the ability to learn the skills.

In summary, the characteristics of LD students, specifically language, cognitive, and motivation deficits, are considered important factors to the outcome of this study. The interaction of these deficits with LPP indicates that a strategy should be developed that provides a step-by-step procedure for LD students to follow. Instruction in the strategy should be more thorough, requiring mastery at each step. If required, increased incentives, goal setting, and self-management techniques should be incorporated in the instructional procedure. All of these modifications will help the LD adolescent to learn independently from lecture presentations. An added benefit would be the presence of nonhandicapped peers who could contribute more complete notes, better comprehension of the lecture content, and an active use of strategies to complete the task. Overall, the nonhandicapped peers could provide a positive model of interaction skills for LD adolescents.

Both of the factors discussed above as contributing to the nonsignificant outcomes of this study are factors that can be manipulated in future investigations. In the next section, modifications to LPP are discussed.

Future Research

The long-term goal of investigating LPP was to develop an instructional intervention that mainstream teachers

could use to aid LD adolescents with the acquisition and comprehension of lecture material. The need for this type of intervention is documented in the literature (Moran, 1980; Schumaker & Deshler, 1983). Based on the findings of this study, it is believed that several modifications to LPP would improve the procedure for use with LD students in mainstream classes and provide content teachers with a critically needed instructional intervention. First, the development of a strategy that provides students with a step-by-step procedure to follow during the pause is needed. Second, the development of a procedure that the mainstream teacher can use to train students in using the interactive strategy is needed. Third, the incorporation of such motivational techniques as goal-setting and self-management into the instructional procedures need to be considered. In the following sections, the development of a strategy and training procedures are discussed.

Designing a Strategy

To prepare students for productive interactions during the pause, essential skills must be identified and a structured procedure developed. Doyle (1983) stated that the cognitive processes required to complete many tasks can be broken into specific steps and systematically taught to students by direct instruction. The effectiveness of this procedure in the development of learning strategies has been documented with LD adolescents at the University of

Kansas IRLD (Deshler & Schumaker, 1986). The IRLD learning strategies provide a step-by-step procedure for students to follow in completing academic tasks (e.g., sentence writing, paragraph comprehension). E. S. Ellis (1987) identified seven important considerations for the development of a learning strategy:

1. Each learning strategy should contain a set of steps that lead to a specific outcome.
2. Each learning strategy is related to a key problem found in the student's setting.
3. A learning strategy is task-specific rather than situation-specific or content-specific (i.e., it can be used in different classes with varied subject matter).
4. Each step in the strategy cues the student to do something: use cognitive strategies (rehearsal, transformational, organization, goal directed, and motivational), use metacognitive strategies (scope out the problem, select a strategy, monitor, adapt another strategy), apply rules, or take overt action.
5. Steps are characterized by simplicity and brevity.
6. Each step usually begins with a verb or word directly related to the activity.
7. Learning strategies frequently employ remembering systems.

In LPP, the cognitive processes necessary to interact effectively during the pause can be identified. Some of these include identifying and understanding the main idea of the lecture segment, identifying facts and details related to the main idea, and pronouncing and defining new vocabulary words. These and additional cognitive skills can be incorporated in a strategy that cues the student to follow the strategy, organize content notes, rehearse the information, and use peer resources to obtain information. For example, if one step on the strategy is to identify the main idea of the lecture segment, the student may (a) self-check adherence to strategy (e.g., what is required with this step); (b) apply rules or techniques to identify the main idea; (c) confirm the main idea with peers in pause group--if they agree, number the main idea and underline it, or if they disagree, discuss and come to agreement, then write it down, number, and underline; and (d) verbally rehearse the main idea. With essential skills identified and a strategy developed, more precise measurement and training can be provided.

A Training Procedure for the Mainstream

For an instructional intervention to be adopted by mainstream teachers, it must be simple to implement (i.e., low management and time demands) and beneficial for all students in the class (Boyer, 1983; Sizer, 1984). Although students need to be trained in the LPP strategy, it should

require a minimum amount of teacher time and incorporated into the context of lecture presentations. Some considerations for developing instructional procedures are as follows:

1. Instruction in the strategy should be incorporated into the lecture. Although introduction to LPP and formation of pause groups should be dealt with outside of the lecture, modeling the strategy, practice, and feedback should all take place during the pause and in the context of a lecture.

2. If possible, introduce and master one step at a time. As each step is mastered, the next step can be introduced and mastered. This assures mastery and keeps instructional time down to a minimum.

3. Instructional procedures validated by IRLD strategy training (Deshler et al., 1984) should be adopted where appropriate. These include pretesting of skills in the strategy; a direct instruction sequence of modeling the step; providing practice and corrective feedback; and memorization of the steps in the strategy.

4. Pause groups should include a heterogeneous mixture of LD and nonhandicapped students.

5. When individual students experience difficulty, peer tutoring outside the lecture may be an option so that the academic focus of the lesson is not lost. Peer

tutoring will individualize instruction and free the teacher to manage the total group and lesson.

6. Motivation techniques that can be incorporated in the instruction include providing a rationale for the intervention and strategy; involving students in discussion of how this strategy can help them; having students set individual and/or group goals for learning; teaching students how to chart their progress; and providing individual reinforcement and corrective feedback. In cases of a severe motivation problem, consider increasing incentives for participation.

The considerations discussed above are just a beginning. Collaboration with mainstream teachers is essential in order to come up with a procedure that is appealing and accommodates the teacher's needs. Finally, the procedure should be field-tested and modified accordingly.

Summary

There is a great need for an instructional intervention for mainstream teachers to use in aiding LD adolescents with the acquisition of lecture content. The LPP has the potential to meet this need. Future investigations of LPP with LD students should take into consideration the findings of this study. It appeared that a combination of language, cognitive, and motivation

deficits impaired the LD students' ability to participate productively in the pause. It is proposed that a strategy be developed that structures the interaction for students. In addition, LPP should be implemented in mainstream classes where lecturing is a primary means of presenting information. The mainstream class and the presence of nonhandicapped peers in the pause groups will also help LD students benefit from LPP. In order for mainstream teachers to adopt LPP, instructional procedures must be developed that are simple to implement and require minimal management and instructional time.

APPENDIX A
OBJECTIVE TEST MEASURE

The Human Body: Test--Part 3--R

Directions: List 5 diseases which afflict the human body.

1. _____

2. _____

3. _____

4. _____

5. _____

Directions: Match the organs of each system of the human body with the system in which they belong. You may use them more than once.

___	6. pituitary	a.	respiratory
___	7. lungs	b.	skeletal
___	8. ovaries	c.	muscular
___	9. heart	d.	endocrine
___	10. skull	e.	reproductive
___	11. nose		
___	12. thyroid		
___	13. voluntary		
___	14. testes		
___	15. spine		

Directions: Fill in the blanks with the correct system.

_____ 16. framework for the body, protects organs

_____ 17. produces hormones

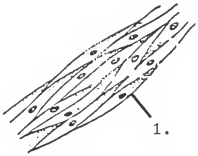
_____ 18. takes in and uses oxygen

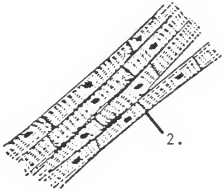
_____ 19. produces offspring

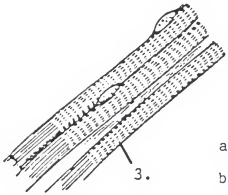
_____ 20. movement

The Human Body: Test--Part 3--A

Directions: Locate each of the following body organs.







a. involuntary (smooth) muscle

b. voluntary (banded) muscle

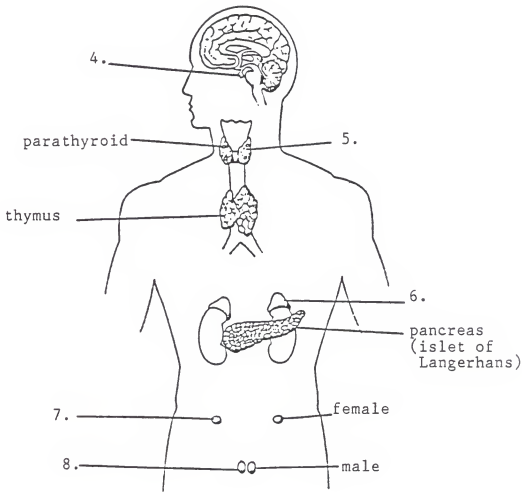
c. heart muscle

1. _____

2. _____

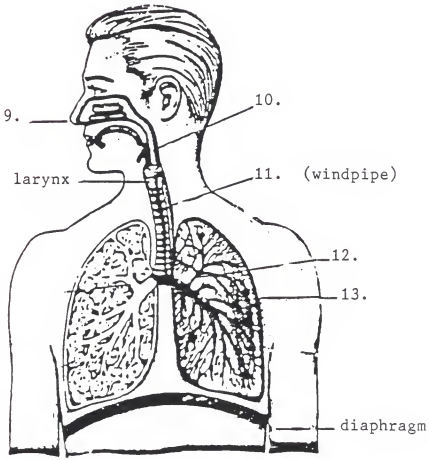
3. _____

Directions: Locate each of the following body organs.



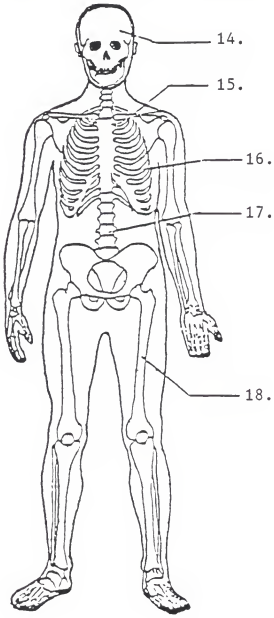
d.	testes	4.	_____
e.	thyroid	5.	_____
f.	ovary	6.	_____
g.	pituitary	7.	_____
h.	adrenal	8.	_____

Directions: Locate each of the following body organs.



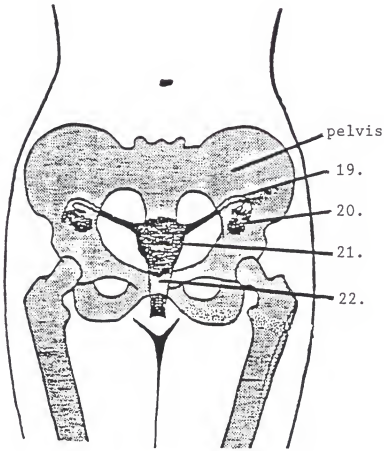
i.	throat	9.	_____
j.	lung	10.	_____
k.	nose	11.	_____
l.	trachea	12.	_____
m.	bronchi	13.	_____

Directions: Locate each of the following body organs.



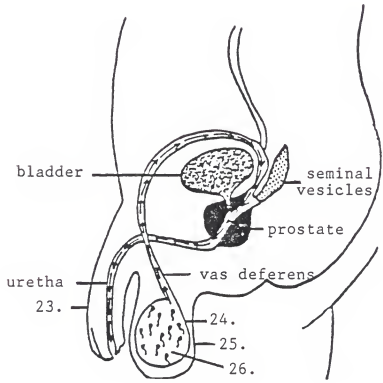
n.	spine	14.	_____
o.	skull	15.	_____
p.	collar bone	16.	_____
q.	ribs	17.	_____
r.	thigh	18.	_____

Directions: Locate each of the following body organs.



s.	ovary	19.	_____
t.	vagina	20.	_____
u.	fallopian tube	21.	_____
v.	uterus	22.	_____

Directions: Locate each of the following body organs.



w.	sperm	23.	_____
x.	testis	24.	_____
y.	penis	25.	_____
z.	scrotum	26.	_____

Directions: Match the proper body system with its primary function.

___	27. respiratory	a.	to provide movement
___	28. skeletal	b.	to produce offspring
___	29. muscular	c.	to protect vital organs
___	30. endocrine	d.	to get oxygen to the cells
___	31. reproductive	e.	to produce hormones

Directions: Match the proper body organ with its primary function.

___	32. nose	a.	to protect the brain
___	33. pituitary	b.	to move the body
___	34. ovary	c.	master control of glands
___	35. skull	d.	to warm and clean air
___	36. voluntary muscles	e.	to produce eggs

APPENDIX B
SPECIFIC LESSON PLANS AND TIME FRAMES FOR EACH ACTIVITY

Recording Free Recall: Lesson Plan Outline for Training Experimental & Control Groups, Day 1

1. Advanced Organizer: At the beginning of the lecture period, the researcher will cover the following points:

a) Explain that for the next few weeks the teacher will be presenting science lessons by lecturing. Ask students what lecturing means and when it is used in other classes. At the end of each lecture, students will be given 3 minutes to write down as many facts as they can recall from the lecture.

b) State that the purpose of the test is to let the researcher and teacher know how much students remember from lecture presentations (Is it a good way to teach?).

c) Inform students the test will not be graded!

d) The researcher will demonstrate how to record facts from the lecture after the day's lesson.

2. Describe & Demonstrate: Following the lecture, the researcher will show the students how to write down facts recalled from the lecture: the researcher thinks aloud, for example, "let's see, the teacher talked about

the digestive system (teacher begins writing on board), that it breaks down food, also talked about kidneys, lungs, skin." Researcher provides several examples, including single word facts, phrases, and complete sentences.

3. Guided Practice: The teacher then elicits facts from students and writes on board; feedback is provided on whether or not the contribution is appropriate.

Experimental & Control Groups, Day 2

4. Independent Practice: A 3-minute free recall measure will follow the lecture. Students will go over their own papers, as students volunteer their answers and teacher provides feedback.

Pause Interaction: Lesson Plan Outline for Training Experimental Group, Day 1

1. Advance Organizer: Following the advanced organizer for recall of facts, the researcher continues:

a) "Have you ever been sitting in class listening to a teacher present a lecture when suddenly you realize you have spaced-out or lost track? I have. Why is it important to listen and remember information from a lecture?" Teacher elicits responses from students.

b) Researcher explains how information is lost when the student is distracted, the teacher is speaking too fast, or the lesson is complicated and hard to

understand. Class is told about students at the University of Florida that had trouble with a chemistry class.

c) Researcher tells students about an instructional technique that helped those students to understand and remember information from lectures. "We want to find out if it will help you in situations when you must learn from lectures."

2. Describe: Researcher explains LPP: how the teacher is going to pause for 2 minutes several times during the lecture. During the pause, three or four students (which you will assign later) will share their notes and talk about what the teacher just said in that segment of the lecture. Explain that besides getting information that they might have missed, some studies have shown that talking about the information helps a student to understand it better and remember it longer ("Would they like that?").

Write on board or use overhead transparency:

a) What kinds of things do you say, do, or ask?

1) what was the main idea?

2) important details and facts?

3) what were the important vocabulary?

4) what do you think the teacher meant?

b) Important Rules!

1) you must participate during the pause and share!

2) you can only talk about what the lecture is about

3) you can't ask the teacher any questions

4) you must interact in a positive way (encourage one another; no negative terms!)

* Consequences of not following rules will be. . . .

c) Following segment 1 of the lecture, the researcher and two students will demonstrate how to interact during the pause. For example, researcher leads: "What was the main thing the teacher talked about?" Researcher and students compare notes and diagrams.

3. Model: Following segment 2 of the lecture, students will be assigned to pause groups and will begin interacting after the researcher and the two students start-off by demonstrating again.

4. Guided Practice: Following segment 3 of the lecture, students will turn towards the members of their group and begin interacting. The researcher and teacher will move around the room helping the groups and providing feedback.

Experimental Group, Day 2

5. Independent Practice: Following the first lecture segment, students will interact, and the teacher will

circulate the room to monitor. If necessary, appropriate interaction can be modeled again following the second segment of the lecture.

APPENDIX C
CONTENT OUTLINE

Lesson Outline for Experimental Group, Experimental Condition, Day 1

1. Class business: 1:40.

2. Begin lesson: 1:42.

I. Respiratory System (RS)

A. Name parts (overhead transparency)--RS is made up of all the body parts that help you breathe: nose, throat, larynx, trachea (windpipe), bronchi, lung, diaphragm.

B. Function of RS--is to take oxygen from the air and send it to all the cells in the body (this is what happens when you inhale). The cells use the oxygen for energy. The waste product, carbon dioxide, is then picked up and it is removed from the cells (this is what happens when you exhale).

C. Process of RS

1. Breathing begins in the nose where the air is warmed, and dirt and bacteria are trapped.

2. Then the air goes to the trachea, or windpipe--a small flap covers the trachea so that food or water cannot enter; the windpipe branches into two short tubes called bronchi.

3. The bronchi move air into both lungs; then the bronchi branch out to many, many small tubes.

D. Diseases of RS: Smoking is a major problem to the lungs, causing lung cancer or emphysema; other afflictions are bronchitis and pneumonia.

3. Students move to pause groups where 2 minutes are allotted for interaction (1 minute is for transition to and from groups): 1:52-1:55.

4. Teacher picks back-up with lesson: 1:55-2:05.

II. Skeletal System (SS)

A. Describe & names parts of SS (refer to overhead transparency)--SS is made up of bones which are living tissue (that is why bones heal after they have been broken).

B. Functions of SS

1. It is the framework of the body--supporting the body and giving it shape.

2. It protects your body organs--the ribs cover and protect the heart and lungs and the brain is protected by the skull.

3. It makes blood cells and platelets in the marrow--marrow is the soft center of the bone.

4. It makes movement possible by being the place where muscles are attached; you could not move if your muscles were not connected to your skeleton.

C. Diseases and afflictions of the spine are meningitis, polio, and spina bifida.

5. Students move to pause groups where 2 minutes are allotted for interaction (1 minute is for transition to and from groups): 2:05-2:08.

6. Teacher picks back-up with lesson: 2:08-2:18.

III. Muscular System (MS)

A. Describe: MS is made up of all the muscles in the body. Muscles make up 50% of our body weight.

B. Function of MS--to control the movement of the body.

C. 3 kinds of muscles:

1. Voluntary muscles move when we tell them. They are attached to the skeleton (for example, muscles in the leg are used for walking and we control them). They are banded, which means they have dark and light stripes (see overhead transparency).

2. Involunary muscles are usually controlled by the nervous system (for example, the muscles in the digestive system are involuntary; also your diaphragm). Involuntary muscles are smooth in appearance (see overhead transparency).

3. Heart muscles are a combination of banded and smooth muscles; they are controlled by the nervous system also.

D. Muscle afflictions & injuries: muscles can become fatigued through overuse; muscles can be injured by some type of accident (sports injuries are common).

7. Students move to pause groups where 2 minutes are allotted for interaction (1 minute is for transition to and from groups): 2:18-2:21.

8. Students clear desk of notes and are given 3 minutes to write down as many facts as they can recall from the day's lecture: 2:21-2:24.

Lesson Outline for Experimental Group,
Experimental Condition, Day 2

1. Class business: 1:40.

2. Review and begin lesson: 1:42.

IV. Endocrine System (ES)

A. Describe: ES is made up of glands which produce secretions known as hormones. The hormones travel through the body in the blood.

B. Glands of ES & functions (see overhead transparency): pituitary, adrenal, thyroid, parathyroids, pancreas, reproductive.

1. Pituitary gland is located at the base of the brain. It is the master control of the other glands. Its major function is to control growth.

2. Adrenal gland is located at the top and back of the kidneys. Its function is to prepare the body for emergencies.

3. Thyroid gland is located in the front of the neck. Its job is to control how fast the body uses food.

4. Parathyroids are also found in the front of the neck. They are attached to the thyroid. Their function is to control the calcium level in the blood.

5. Pancreas is located under the stomach. Its job is to produce a hormone called insulin. Insulin breaks down sugars to provide energy for the body.

6. Reproductive glands--ovaries & testes:

a. Ovaries are found in the lower abdomen of the female; they are the egg producing organ of the female.

b. Testes, located in the male scrotum, produce sperm; these glands secrete hormones that control sexual development.

C. Diseases or afflictions: venereal diseases and mumps

3. Students move to pause groups where 2 minutes are allotted for interaction (1 minute is for transition to and from groups): 1:52-1:55.

4. Teacher picks back-up with lesson: 1:55.

V. Reproductive System (RS)

A. Function of RS is to produce offspring; human reproduction depends on the production of male cells (sperm) and female cells (eggs). The male and female systems are different because they have different jobs to do:

1. Female cells are produced in the ovaries and are called eggs. An egg is the size of a pinpoint. A girl is born with thousands of eggs. One matures and is released approximately once a month during most of her adult life (hormones control this function).

2. Male cells are produced in the testes and are called sperm. This production of sex cells is also due to hormones. The testes produce billions of sperm cells. Each has a head and a tail. These are passed out of the body through the penis.

B. Process of RS: When a sperm and egg unite in the body, fertilization takes place. These two cells, now united, continue to reproduce and form a baby. The baby grows in the woman's uterus until birth. It then goes through the vagina, or birth canal, to enter the world.

5. Students move to pause groups where 2 minutes are allotted for interaction (1 minute is for transition to and from groups): 2:05-2:08.

6. Students clear desk of notes and are given 3 minutes to write down as many facts as they can recall from the day's lecture: 2:08-2:11.

Lesson Outline for Control Group,
Experimental Condition, Day 1

1. Class business: 12:44.

2. Students review vocabulary: 12:46-12:49.

3. Begin lesson: 12:49.

I. Respiratory System (RS)

A. Name parts (overhead transparency)--RS is made up of all the body parts that help you breathe: nose, throat, larynx, trachea (windpipe), bronchi, lung, diaphragm.

B. Function of RS--is to take oxygen from the air and send it to all the cells in the body (this is what happens when you inhale). The cells use the oxygen for energy. The waste product, carbon dioxide, is then picked up and it is removed from the cells (this is what happens when you exhale).

C. Process of RS

1. Breathing begins in the nose where the air is warmed, and dirt and bacteria are trapped.

2. Then the air goes to the trachea, or windpipe--a small flap covers the trachea so that food or water cannot enter; the windpipe branches into two short tubes called bronchi.

3. The bronchi move air into both lungs; then the bronchi branch out to many, many small tubes.

D. Diseases of RS: Smoking is a major problem to the lungs, causing lung cancer or emphysema; other afflictions are bronchitis and pneumonia.

II. Skeletal System (SS)

A. Describe & names parts of SS (refer to overhead transparency)--SS is made up of bones which are living tissue (that is why bones heal after they have been broken).

B. Functions of SS

1. It is the framework of the body--supporting the body and giving it shape.

2. It protects your body organs--the ribs cover and protect the heart and lungs and the brain is protected by the skull.

3. It makes blood cells and platelets in the marrow--marrow is the soft center of the bone.

4. It makes movement possible by being the place where muscles are attached; you could not move if your muscles were not connected to your skeleton.

C. Diseases and afflictions of the spine are meningitis, polio, and spina bifida.

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A. Describe: MS is made up of all the muscles in the body. Muscles make up 50% of our body weight.

B. Function of MS--to control the movement of the body.

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2. Involunary muscles are usually controlled by the nervous system (for example, the muscles in the digestive system are involuntary; also your diaphragm). Involuntary muscles are smooth in appearance (see overhead transparency).

3. Heart muscles are a combination of banded and smooth muscles; they are controlled by the nervous system also.

D. Muscle afflictions & injuries: muscles can become fatigued through overuse; muscles can be injured by some type of accident (sports injuries are common).

4. Students review notes: 1:19-1:22.

5. Students clear desk of notes and are given 3 minutes to write down as many facts as they can recall from the day's lecture: 1:22-1:25.

Lesson Outline for Control Group,
Experimental Condition, Day 2

1. Class business: 12:44.

2. Students review notes: 12:46-12:49.

3. Teacher reviews and begins lesson: 12:49.

IV. Endocrine System (ES)

A. Describe: ES is made up of glands which produce secretions known as hormones. The hormones travel through the body in the blood.

B. Glands of ES & functions (see overhead transparency): pituitary, adrenal, thyroid, parathyroids, pancreas, reproductive.

1. Pituitary gland is located at the base of the brain. It is the master control of the other glands. Its major function is to control growth.

2. Adrenal gland is located at the top and back of the kidneys. Its function is to prepare the body for emergencies.

3. Thyroid gland is located in the front of the neck. Its job is to control how fast the body uses food.

4. Parathyroids are also found in the front of the neck. They are attached to the thyroid. Their function is to control the calcium level in the blood.

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b. Testes, located in the male scrotum, produce sperm; these glands secrete hormones that control sexual development.

C. Diseases or afflictions: venereal diseases and mumps

V. Reproductive System (RS)

A. Function of RS is to produce offspring; human reproduction depends on the production of male cells (sperm) and female cells (eggs). The male and female systems are different because they have different jobs to do:

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2. Male cells are produced in the testes and are called sperm. This production of sex cells is also due to hormones. The testes produce billions of sperm cells. Each has a head and a tail. These are passed out of the body through the penis.

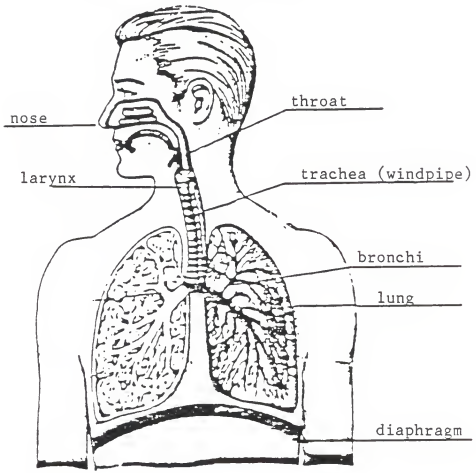
B. Process of RS: When a sperm and egg unite in the body, fertilization takes place. These two cells, now united, continue to reproduce and form a baby. The baby grows in the woman's uterus until birth. It then goes through the vagina, or birth canal, to enter the world.

4. Students review notes: 1:09-1:12.

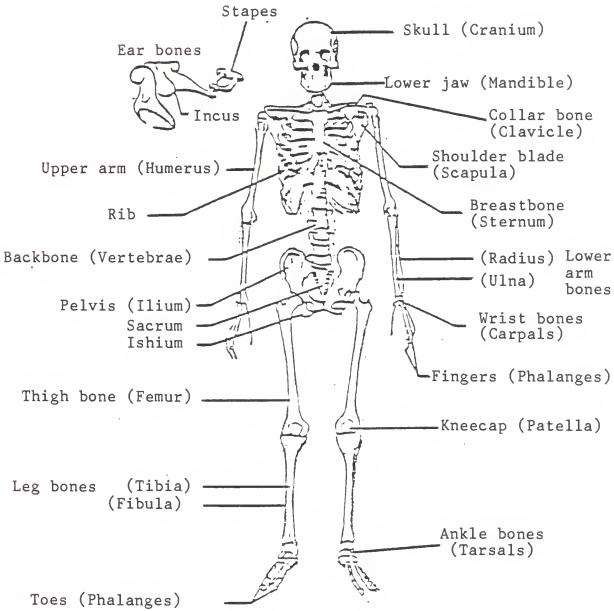
5. Students clear desk of notes and are given 3 minutes to write down as many facts as they can recall from the day's lecture: 1:12-1:15.

APPENDIX D
OVERHEAD TRANSPARENCIES/STUDENT HANDOUTS
FOR EXPERIMENTAL CONDITIONS

THE RESPIRATORY SYSTEM



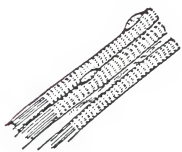
The Skeletal System



MUSCULAR SYSTEM

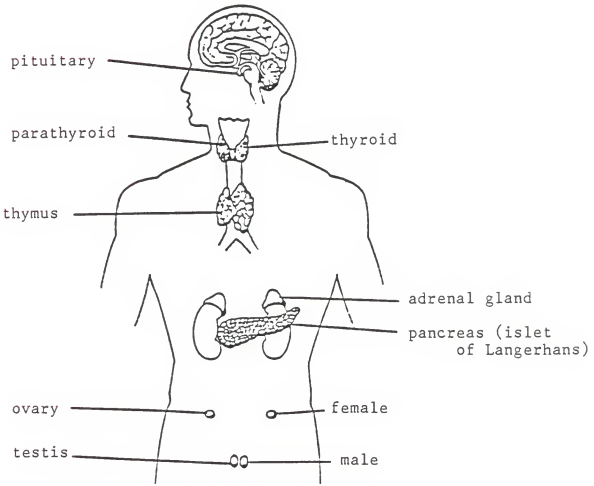
smooth

cardiac

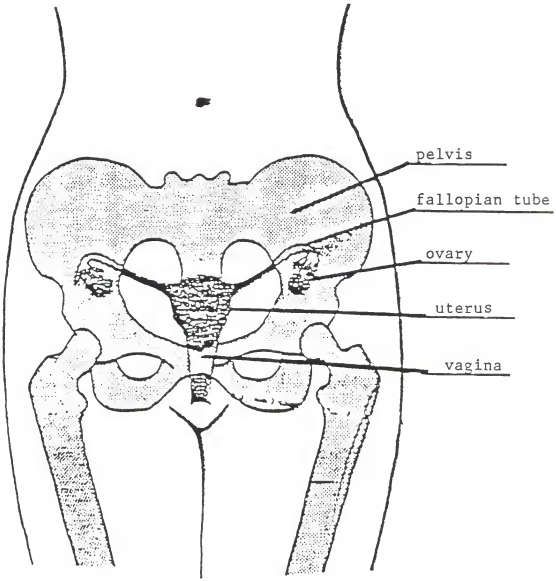


striated

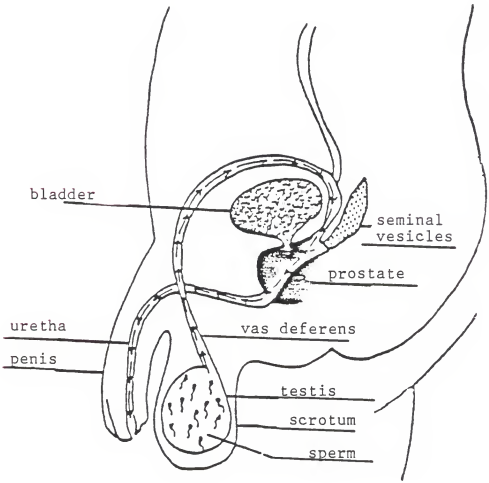
THE ENDOCRINE SYSTEM



THE FEMALE REPRODUCTIVE SYSTEM



THE MALE REPRODUCTIVE SYSTEM



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BIOGRAPHICAL SKETCH

Pam Hudson was born on October 25, 1950, in Coral Gables, Florida. Ms. Hudson was raised in Miami. She was graduated from high school in 1968. In 1971, she received her A.S. degree and, in 1974, earned a B.S. degree in special education.

Ms. Hudson worked with mildly handicapped adolescents for 9 years in Dade County Public Schools and, during that time, earned a M.S. in diagnostic teaching. For the first 5 years, she taught in a resource class for varying exceptionalities. In the last 4 years, she had the opportunity to pilot a consulting teacher model. This experience greatly influenced Ms. Hudson's perceptions of the special educator's role in educating the mildly handicapped. In her 4 years as chairman of the special education department, Ms. Hudson was able to organize a continuum of program options so that the more severely learning disabled were receiving the intensive instruction they required, while the mildly handicapped were prepared for transition and return to the regular program.

Ms. Hudson's doctoral program included studies in learning disabilities, special programs for mildly handicapped adolescents, and administration/supervision.

As a graduate assistant, she had numerous teaching, research, and writing experiences. Ms. Hudson is interested in training special education teachers to work with mildly handicapped students.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Cecil D. Mercer, Chairman
Professor of Special Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Phillip A. Clark
Professor of Educational Leadership

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Vivian I. Correa
Assistant Professor of Special Education

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This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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